

REMARKS

The present application was filed on August 26, 2003 with claims 1-33.

In the final Office Action dated October 18, 2006, the Examiner: (i) rejected claims 1-4, 7, 9-13, 16, 18-22, 26-28, 31 and 33 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,086,618 (hereinafter "Al-Hilali") in view of U.S. Patent No. 6,216,119 (hereinafter "Jannarone"); and (ii) rejected claims 5, 6, 8, 14, 15, 17, 23-25, 29, 30 and 32 under 35 U.S.C. §103(a) as being unpatentable over Al-Hilali in view of Jannarone in further view of U.S. Patent No. 6,959,335 (hereinafter "Hayball").

In this response, Applicants respectfully traverse the §103(a) rejections. Applicants respectfully request reconsideration of the present application in view of the remarks below.

With regard to the §103(a) rejections, Applicants initially note that a proper case of obviousness requires that the cited references when combined must "teach or suggest all the claim limitations," and that there be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references or to modify the reference teachings. See Manual of Patent Examining Procedure (MPEP), Eighth Edition, August 2001, §706.02(j).

Applicants submit that the Examiner has failed to establish a proper case of obviousness in the §103(a) rejection of claims 1-4, 7, 9-13, 16, 18-22, 26-28, 31 and 33 over Al-Hilali and Jannarone, in that the Al-Hilali and Jannarone references, even if assumed to be combinable, fail to teach or suggest all the claim limitations, and in that no cogent motivation has been identified for combining the references or modifying the reference teachings to reach the claimed invention.

Independent claim 1 is directed to a method of constructing a model representative of a resource for use in managing a service associated with the resource, comprising the steps of associating a resource abstract model with the resource; wherein the resource abstract model is configured to automatically determine a set of resource metrics to be used to construct a model representative of the resource such that a reduced set of resource metrics is considered; and constructing the model representative of the resource based on the reduced set of resource metrics obtained in accordance with the resource abstract model.

In an illustrative embodiment of the present invention, resource abstract models (RAMs) facilitate model discovery in that they can greatly reduce the data collected for model construction, a consideration that, if not addressed, can significantly limit the extent to which model discovery is practical. To appreciate the concern here, consider the IBM DB2 database management system. In an enterprise system, there may be multiple instances, each collecting approximately 500 metrics available through the performance monitor. Other software components (e.g., application servers, web servers, operating systems, Java Virtual Machines) collect a large number of metrics as well. Thus, it is not uncommon to have tens to hundreds of thousand of metrics to consider when constructing a quantitative model. Using purely data driven techniques requires collecting data for each metric so that its contribution to a quantitative model can be evaluated. Unfortunately, data collection is time consuming and storage intensive. (See the present specification at page 8, lines 8-18).

By way of further illustration, FIG. 4 of the present application depicts an overall process for automated construction and exploitation of quantitative models using abstract models, according to an embodiment of the present invention. In step 405, one or more RAMs are constructed by resource experts for that type of resource. That is, RAMs are constructed by one or more subject matter experts for the measurement source. For example, a RAM for a web server access log might be constructed by a web server design and/or support team. The model builder uses the RAM to select metrics based on logical relationships. For example, there are many measures of paging (e.g., page-ins, page-outs, faults, page cache hits). The RAM specifies that these are related metrics so that the model builder knows that not all of them may be needed in building the model. Using the RAM reduces the model dimension, which has at least three important consequences: (1) less computation is required to construct the model; (2) less data is collected since fewer parameters are estimated and so the model can adapt more quickly; and (3) since there are fewer parameters, the model tends to be more robust to noise. (See the present specification at page 12, line 15 through page 13, line 2).

The Examiner in formulating the §103(a) rejection of claim 1 argues that each and every one of the above-noted limitations is met by the collective teachings of Al-Hilali and Jannarone. Below,

Applicants explain how such portions of Al-Hilali and Jannarone fail to teach or suggest what the Examiner contends that they teach or suggest. While Applicants may refer from time to time to each reference alone in describing its deficiencies, it is to be understood that such arguments are intended to point out the overall deficiency of the cited combination.

In characterizing the Al-Hilali reference as allegedly meeting certain limitations of claim 1, the Examiner relies primarily on Figure 4, column 9, lines 31-36 and column 10, lines 11-14. The Al-Hilali reference fails to disclose the limitation “wherein the resource abstract model is configured to automatically determine a set of resource metrics to be used to construct a model representative of the resource such that a reduced set of resource metrics is considered.” Rather, Al-Hilali creates a model “by first determining the resources used by the server application and defining ‘transactions’ that occur at the server application. A transaction is an identifiable operation occurring at the server application in response to user/client behavior and can typically be measured in rate form (transactions per second). Furthermore, an anticipated user load based on user behavior can also be reduced to transaction rates with a server application.” (See page 4, lines 56-64 of Al-Hilali). The Al-Hilali reference appears to be a data driven technique similar to the IBM DB2 database management system referenced above.

The Examiner looks to the Jannarone reference to supplement the above-noted deficiencies of Al-Hilali as applied to claim 1. However, the Jannarone reference also fails to teach or suggest configuring a resource abstract model “to automatically determine a set of resource metrics to be used to construct a model representative of the resource such that a reduced set of resource metrics is considered.”

In characterizing the Jannarone reference as allegedly meeting certain limitations of claim 1, the Examiner relies primarily on column 3, lines 21-34 and column 4, lines 22-32 of Jannarone.

The Jannarone reference, at col. 3, lines 21-34, states the following:

The present invention meets the needs described above in a multi-kernel neural network computing architecture configured to learn correlations among feature values as the network monitors and imputes measured input values and also forecasts future output values. This computing architecture, referred to as a concurrent-learning information processor (CIP), includes a multi-kernel neural network array with the capability to learn and predict simultaneously. The CIP also includes a

manager and an input-output transducer that may be used for input-output refinement. These components allow the computing capacity of the multi-kernel array to be reassigned in response to measured performance or other factors.

Jannarone, at col. 4, lines 22-32 states the following:

Generally described, the invention is a method for responding to computed output values that are based on measured input values received during a current time trial and during one or more historical time trials. The measured input values are received for the current time trial, and a vector of input feature values is assembled based on the measured input values. The input feature values are provided to a multi-kernel processor. Each kernel of the processor is operative for receiving one or more of the input feature values and performing a number of operations using the input feature values.

The relied upon portions of Jannarone do not teach or suggest the recited limitations of claim

1. No where does Jannarone disclose configuring a resource abstract model to automatically determine a set of resource metrics to be used to construct a model representative of the resource such that a reduced set of resource metrics is considered, as recited in the claimed invention.

Thus, the Jannarone reference fails to supplement the above-noted deficiencies of Al-Hilali as applied to claim 1. Accordingly, it is believed that the combined teachings of Al-Hilali and Jannarone fail to meet the limitations of amended claim 1.

Also, the Examiner has failed to identify a cogent motivation for combining Al-Hilali and Jannarone in the manner proposed. The Examiner provides the following statement of motivation beginning at page 4, first paragraph of the Office Action:

Al-Hilali and Jannarone are analogous art because they are both related to estimating resource usage requirements.

Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the multi-kernel neural network computing architecture of Jannarone in the method of Al-Hilali because Jannarone utilizes a multi-kernel array which learns and predicts simultaneously in "real time" (see col. 3, lines 43-45), and as a result, Jannarone reports an improvement over the drawbacks of conventional neural network systems and a significant advancement in neural network techniques (see col. 3, lines 45-48 and col. 7, lines 51-52).

The Federal Circuit has stated that when patentability turns on the question of obviousness, the obviousness determination “must be based on objective evidence of record” and that “this precedent has been reinforced in myriad decisions, and cannot be dispensed with.” In re Sang-Su Lee, 277 F.3d 1338, 1343 (Fed. Cir. 2002). Moreover, the Federal Circuit has stated that “conclusory statements” by an examiner fail to adequately address the factual question of motivation, which is material to patentability and cannot be resolved “on subjective belief and unknown authority.” Id. at 1343-1344. There has been no showing in the present §103(a) rejection of claim 1 of objective evidence of record that would motivate one skilled in the art to combine Al-Hilali and Jannarone to produce the particular limitations in question. The above-quoted statement of motivation provided by the Examiner appears to be a conclusory statement of the type ruled insufficient in the In re Sang-Su Lee case. Furthermore, the proposed combination appears to be based primarily on hindsight, with the Examiner attempting to reconstruct the claimed arrangement from disparate references.

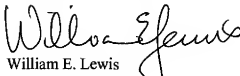
For at least these reasons, Applicants assert that claim 1 is patentable over Al-Hilali and Jannarone.

Independent claims 11, 20 and 27 include limitations similar to those of claim 1, and are therefore believed allowable for reasons similar to those described above with reference to claim 1.

Dependent claims 2-10, 12-19, 21-26 and 28-33 are believed patentable not only due to their respective dependence on claims 1, but also because such claims recite patentable subject matter in their own right. Also, Hayball fails to remedy the above-described deficiencies of Al-Hilali and Jannarone.

In view of the above, Applicants believe that claims 1-33 are in condition for allowance, and respectfully request withdrawal of the §103(a) rejections.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "William E. Lewis". The signature is fluid and cursive, with the first name "William" being more prominent and the last name "Lewis" following in a similar style.

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